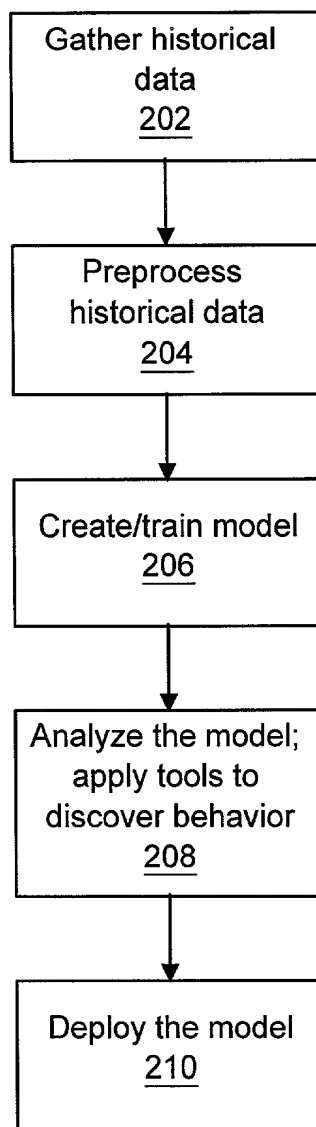


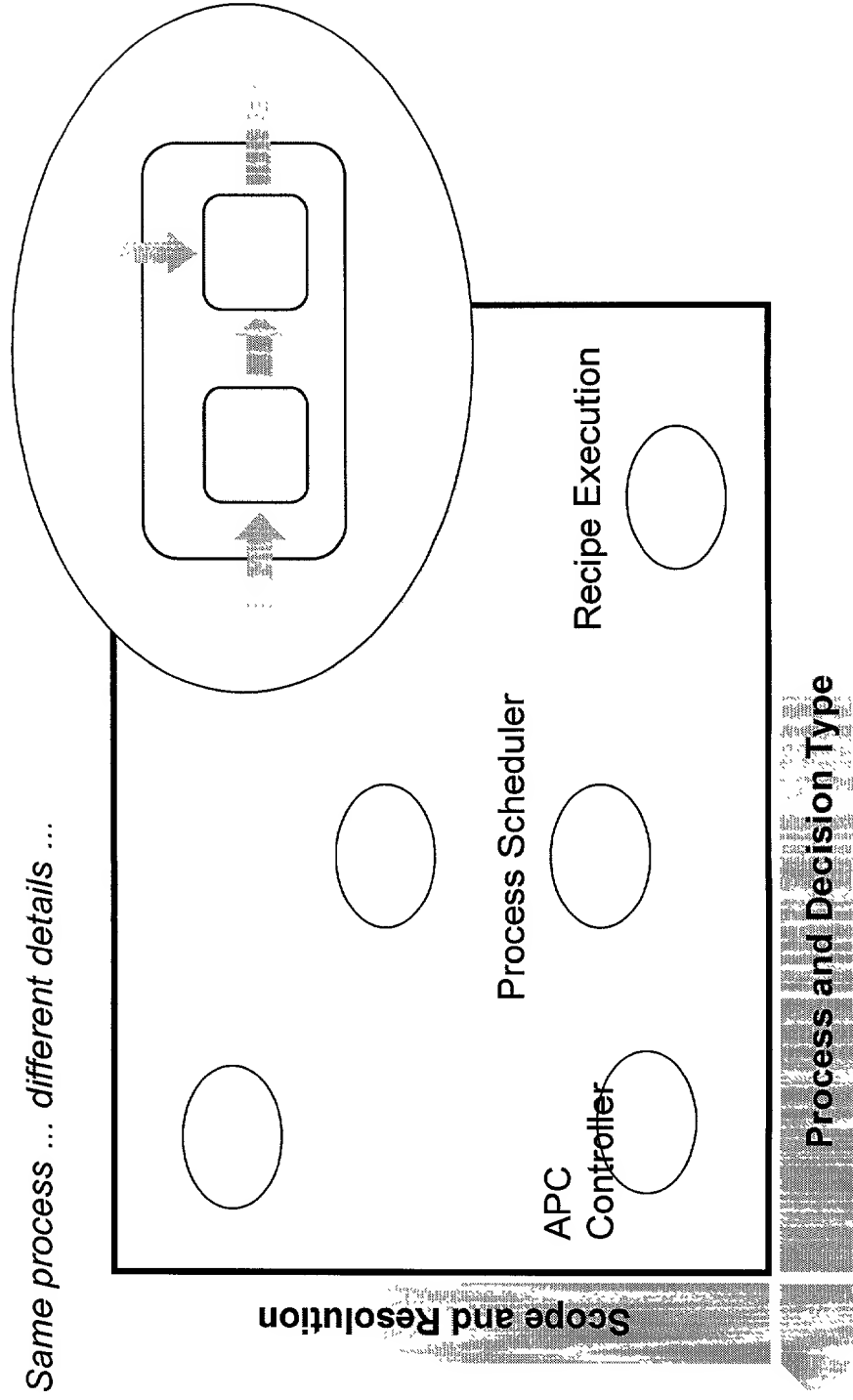
**Figure 1**



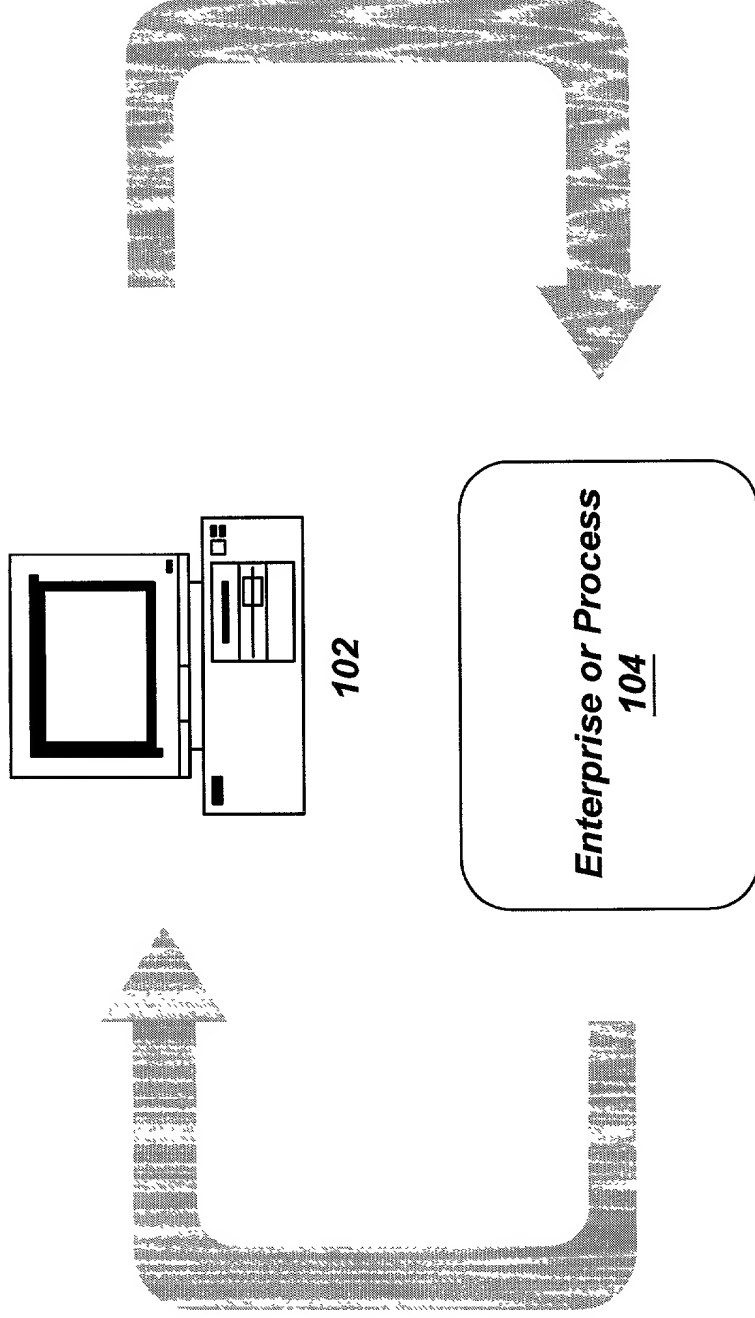
**Figure 2**  
(Prior art)

## Many Types of Decisions

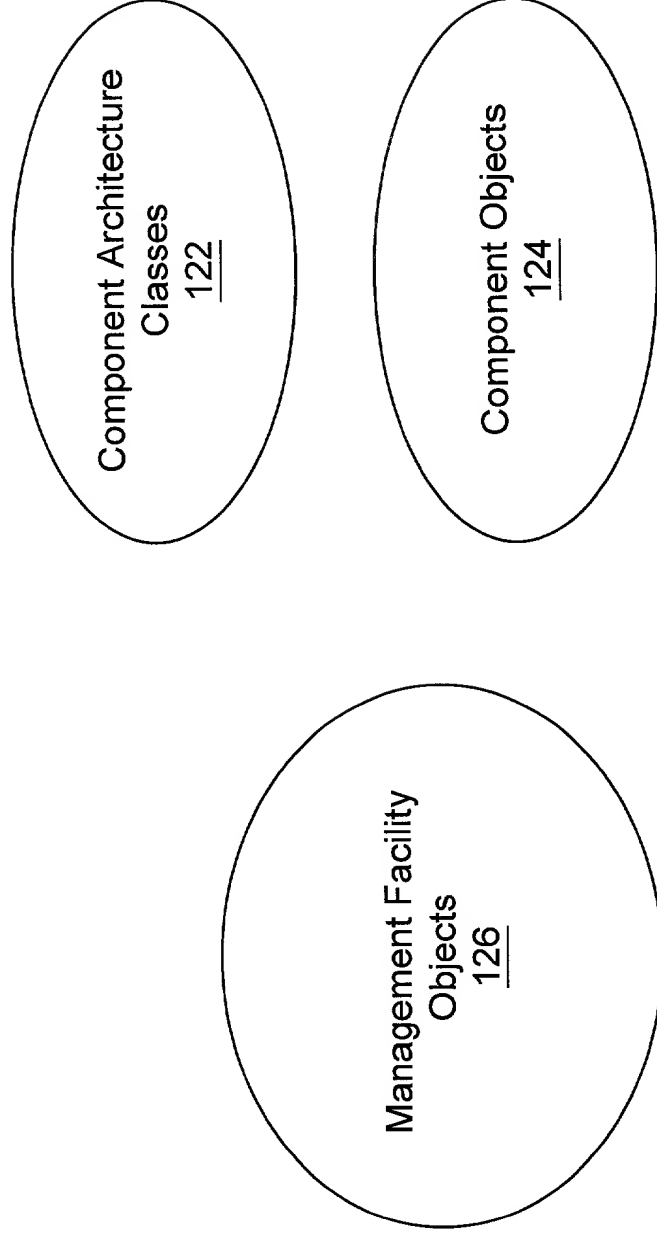
Same process ... different details ...



**Figure 3**  
(Prior art)



**Figure 4**



**Figure 5**

Component Architecture Classes

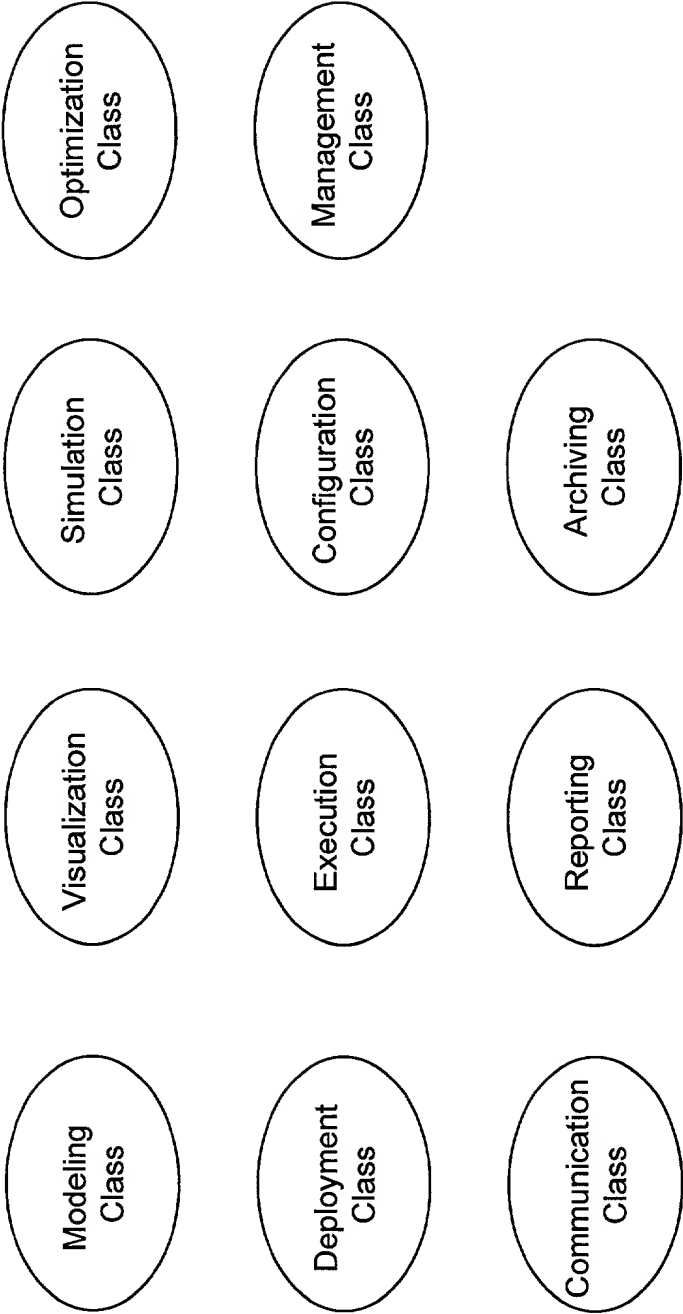
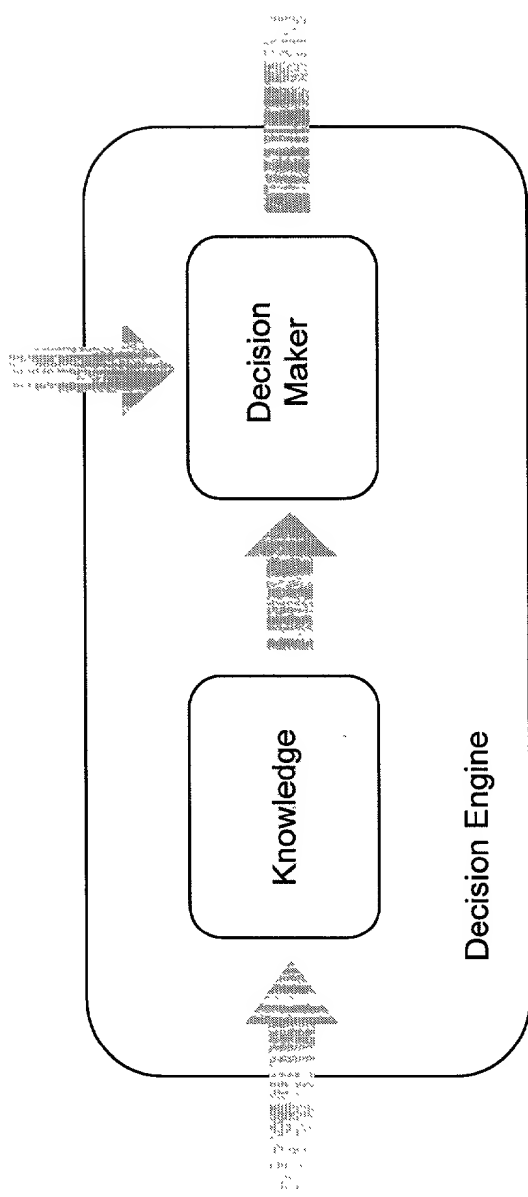


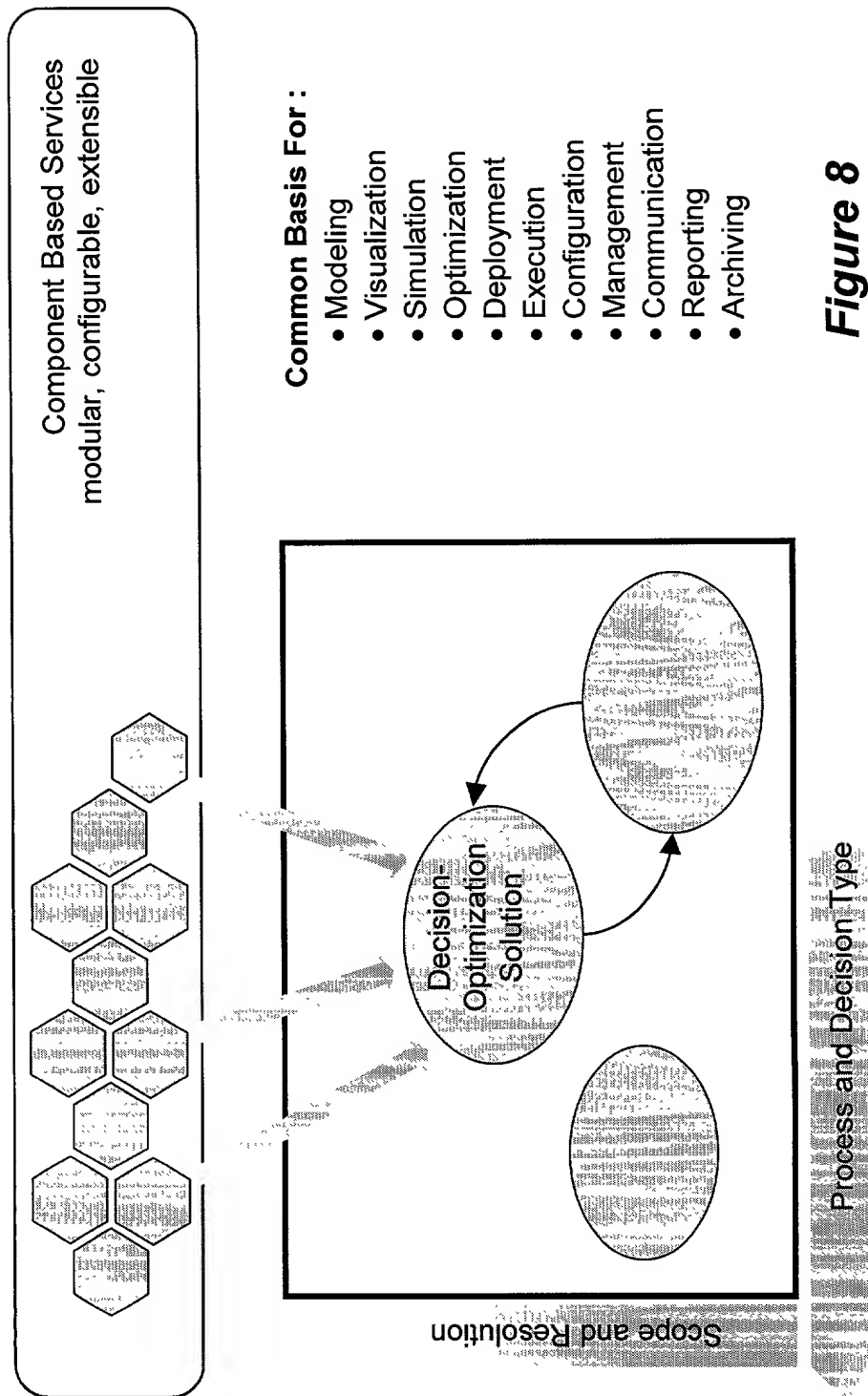
Figure 6

## Encapsulated Decision Engine



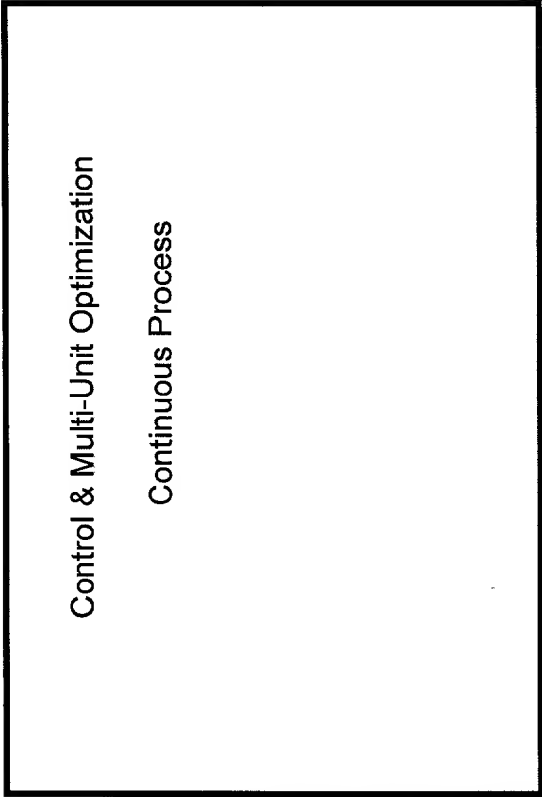
**Figure 7**

## Component Architecture of the Preferred Embodiment





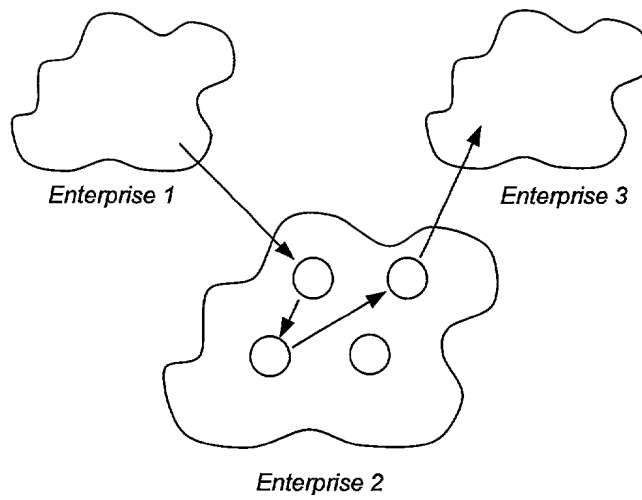
Unified Approach



Scope and Resolution

Process and Decision Type

Figure 9



Events Between Enterprises

**Figure 10**

# Unified Modeling Framework

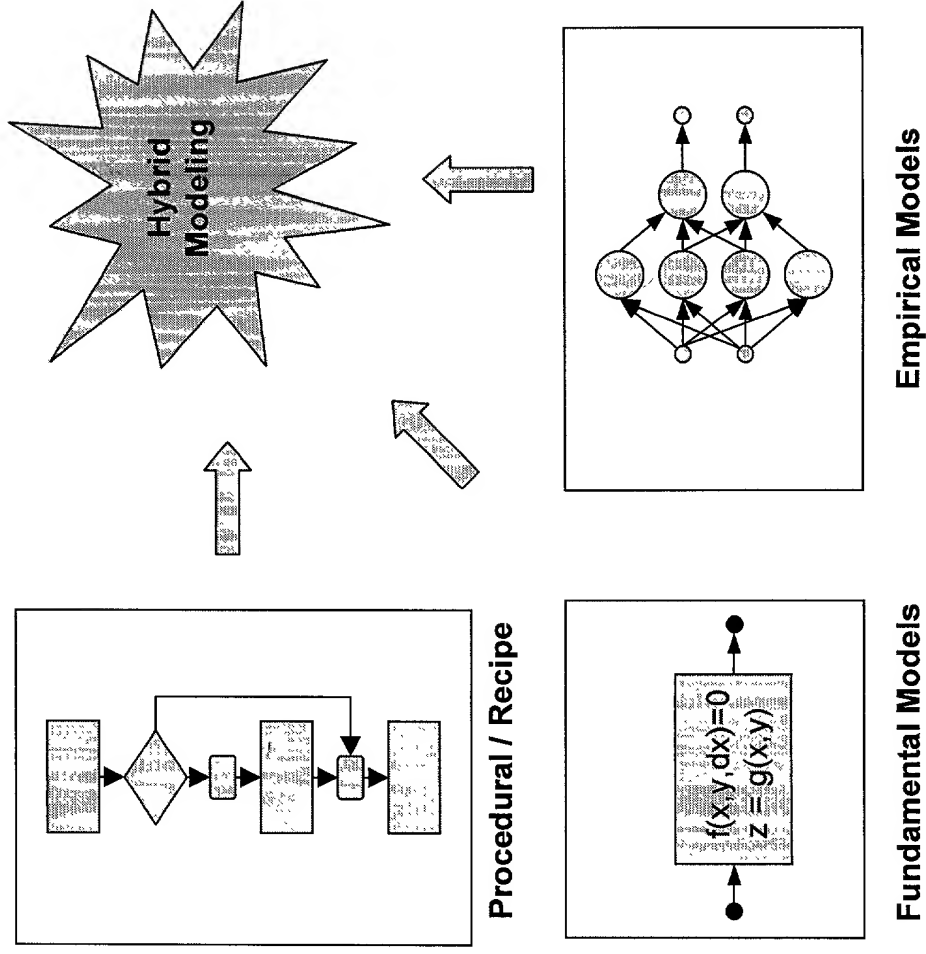
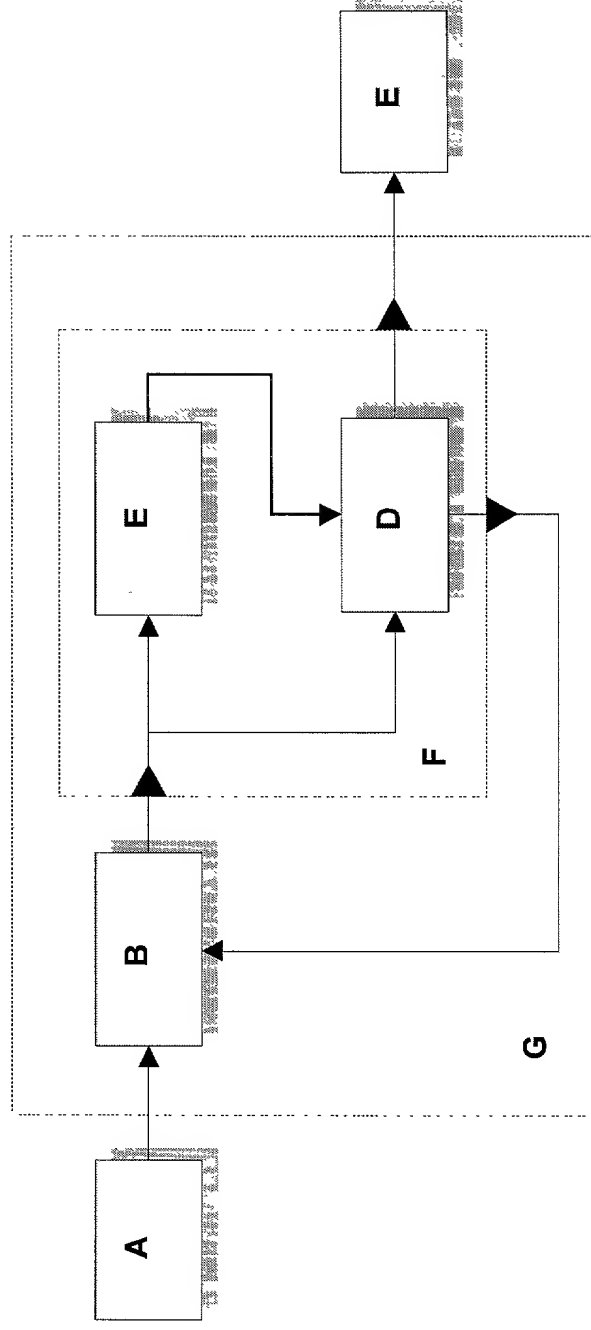


Figure 11

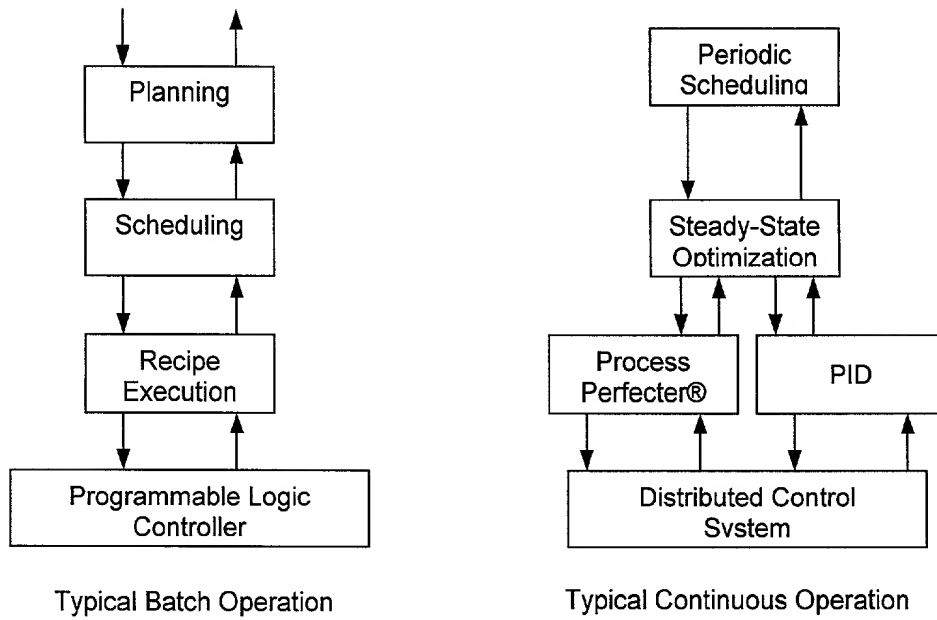
## Model Aggregation

Aggregate heterogeneous combinations of model components ...



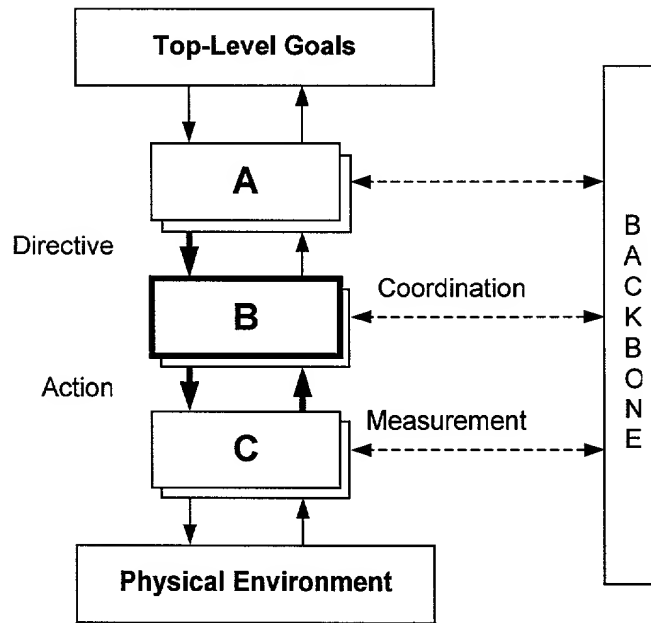
**Figure 12**

... treat encapsulated aggregate as another model



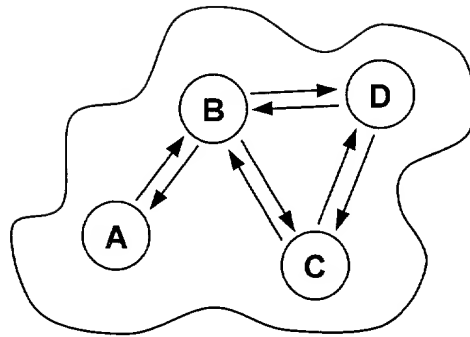
Examples of traditional  
decision-making hierarchies

**Figure 13**



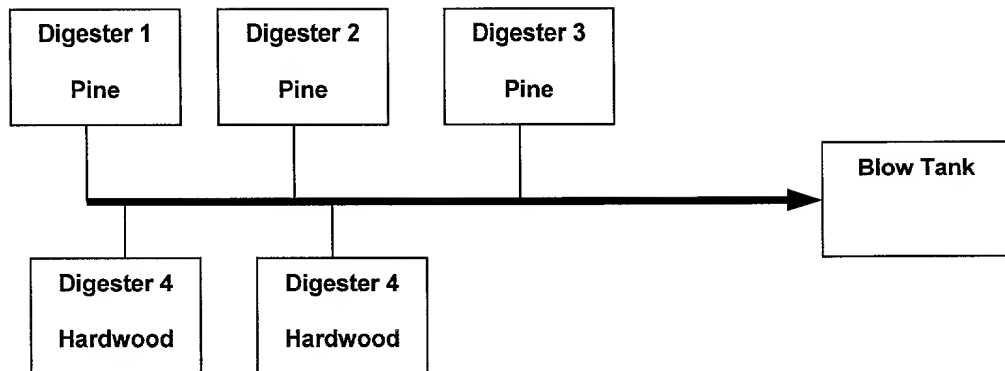
Flexible decision-making hierarchy

**Figure 14**



Non-hierarchy decision-making network

***Figure 15***

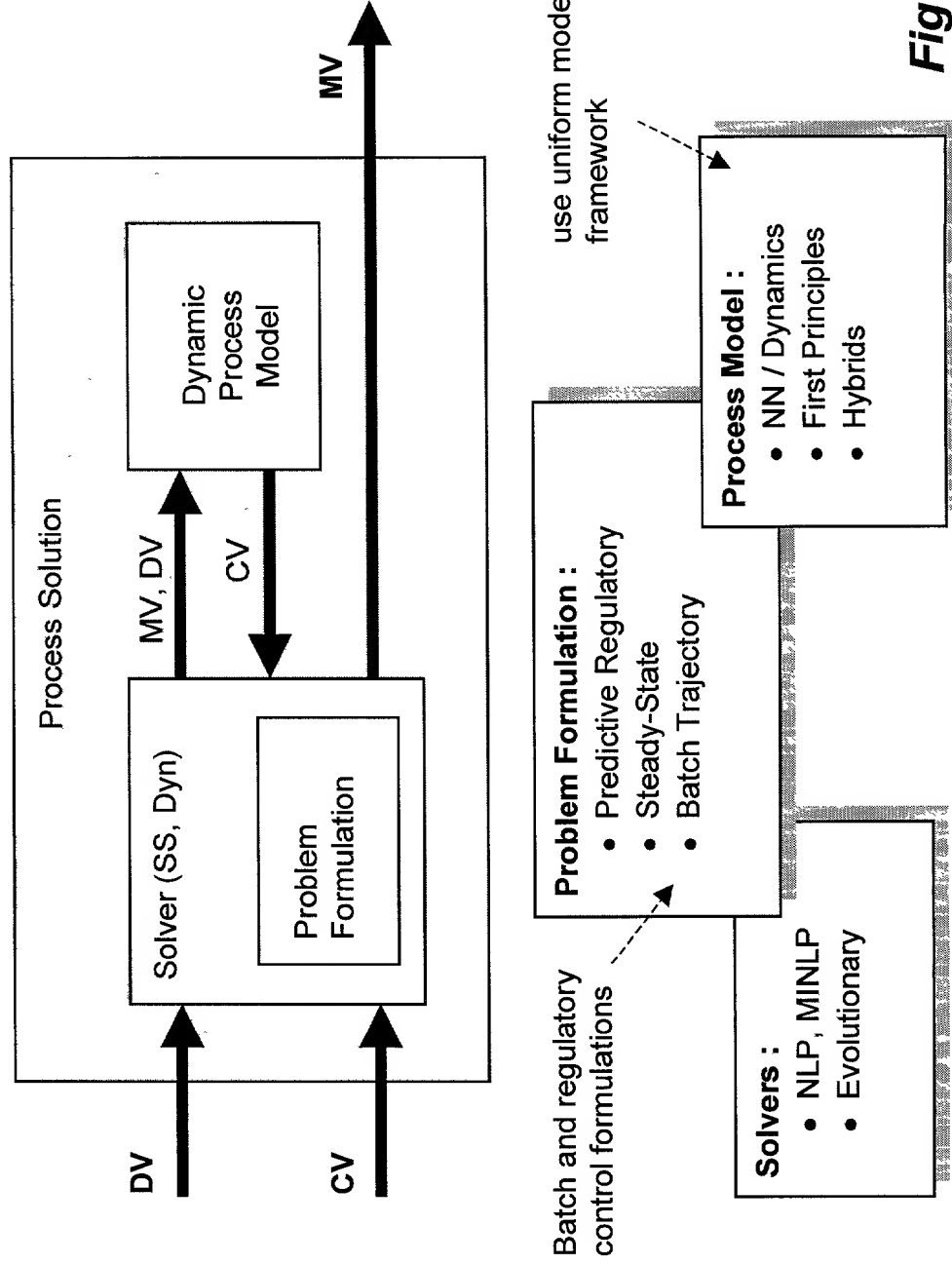


Digester line

**Figure 16**

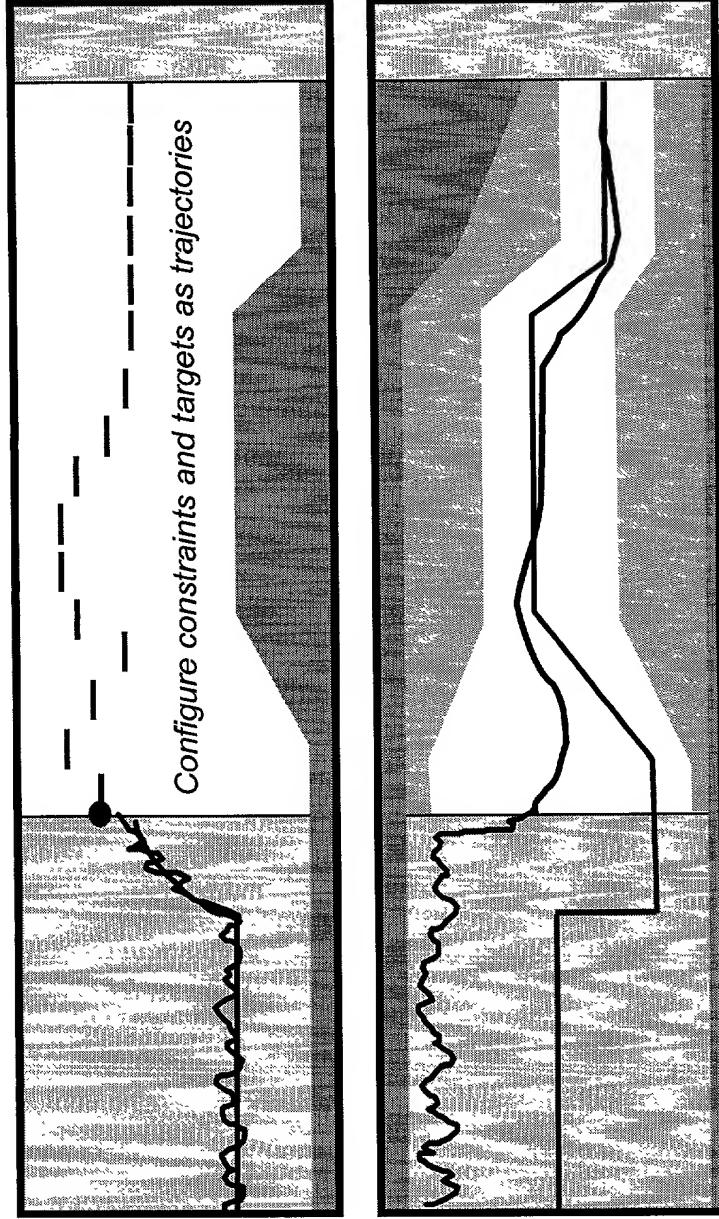


## Flexible Solution Formulation



**Figure 17**

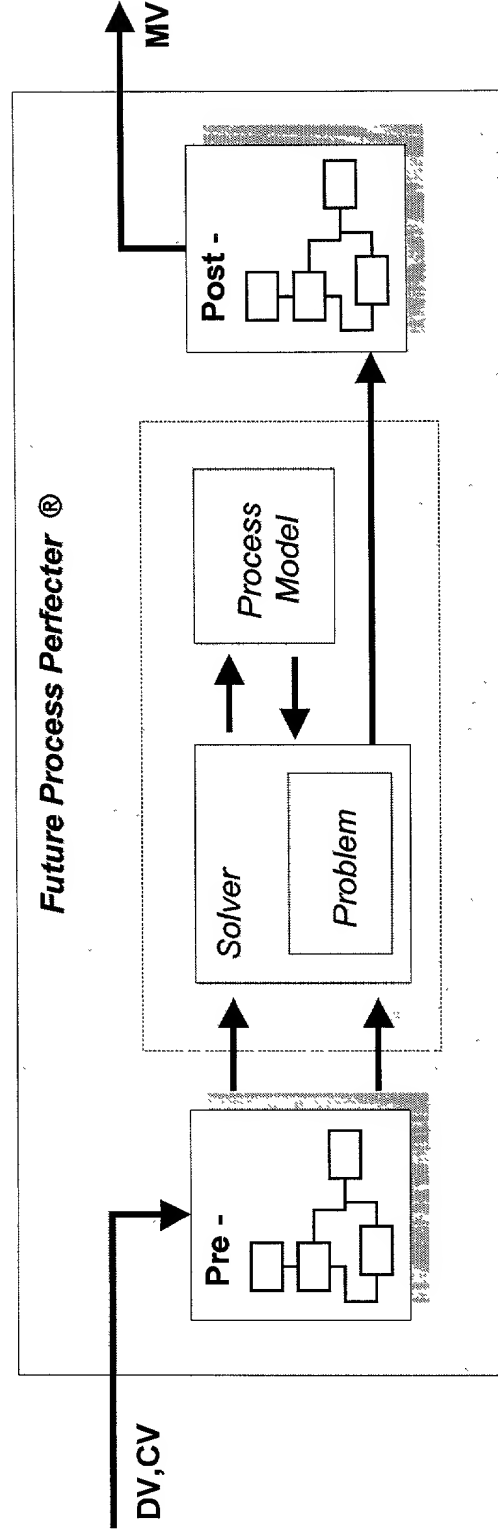
## Flexible Dynamic Optimization



**Figure 18**

## Embedded Data Processing

Aggregation of models and Decision-Engines allows processing to be embedded within a controller ...

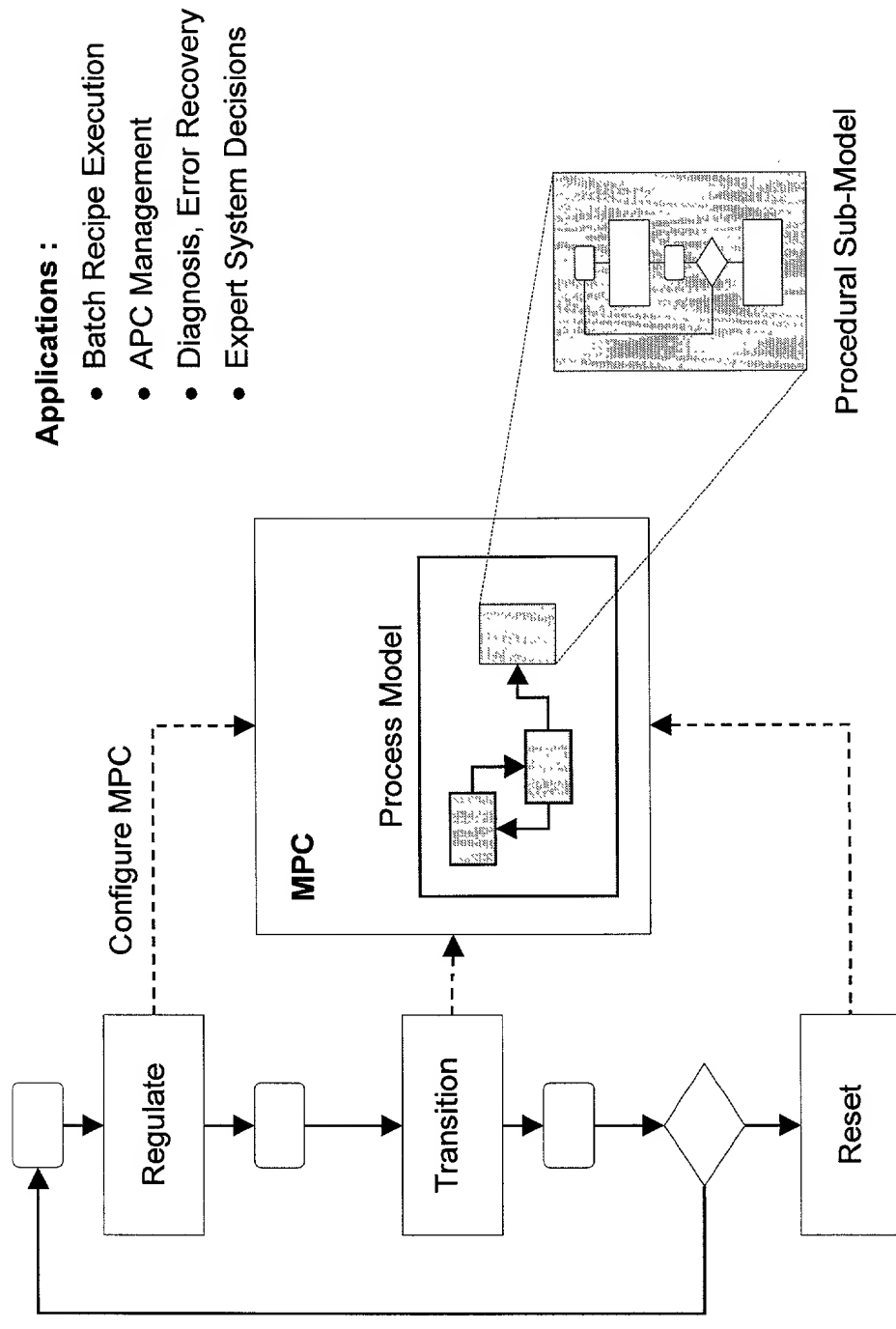


### Embedded Processing for :

- Non-Linear transformation
- Feature creation
- Process estimation ( VOA® )
- Error handling

**Figure 19**

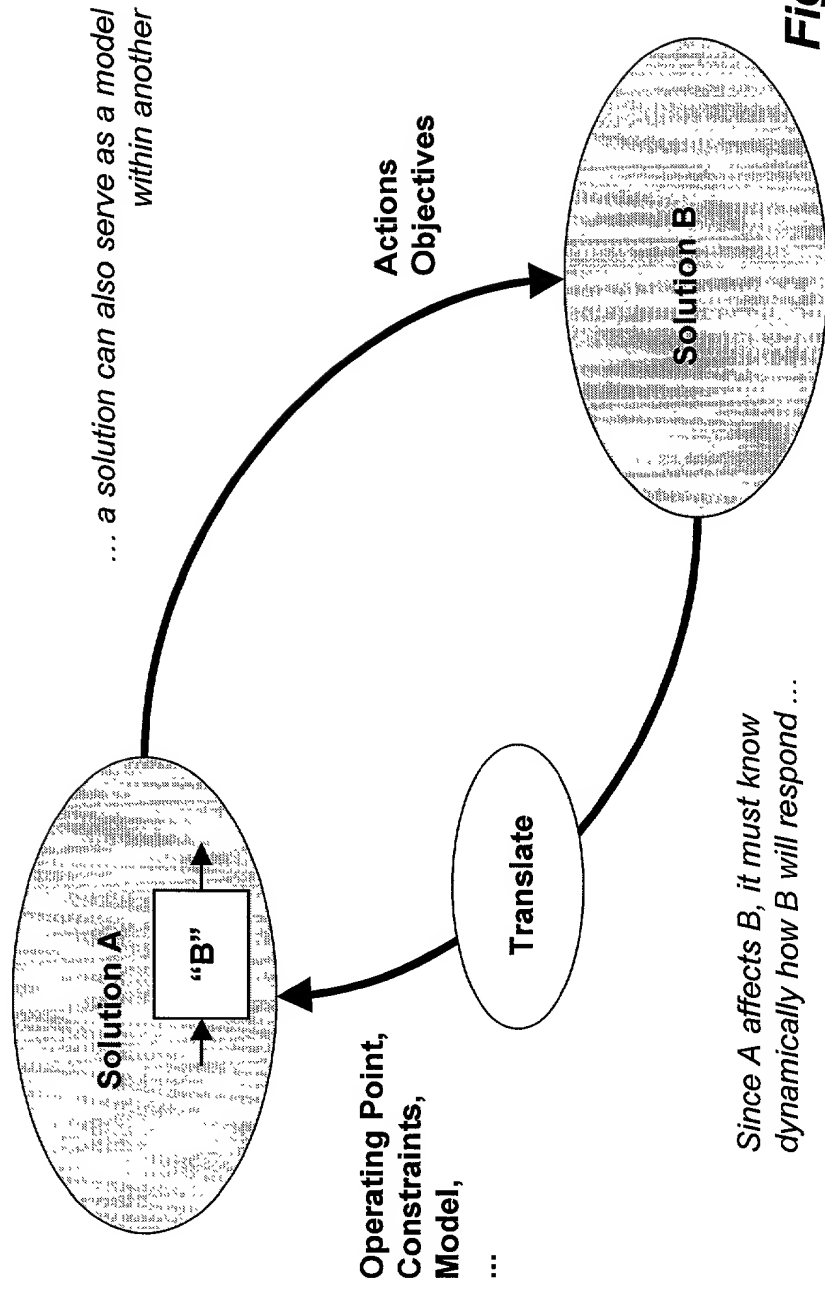
## Treat Procedures As Models



**Figure 20**

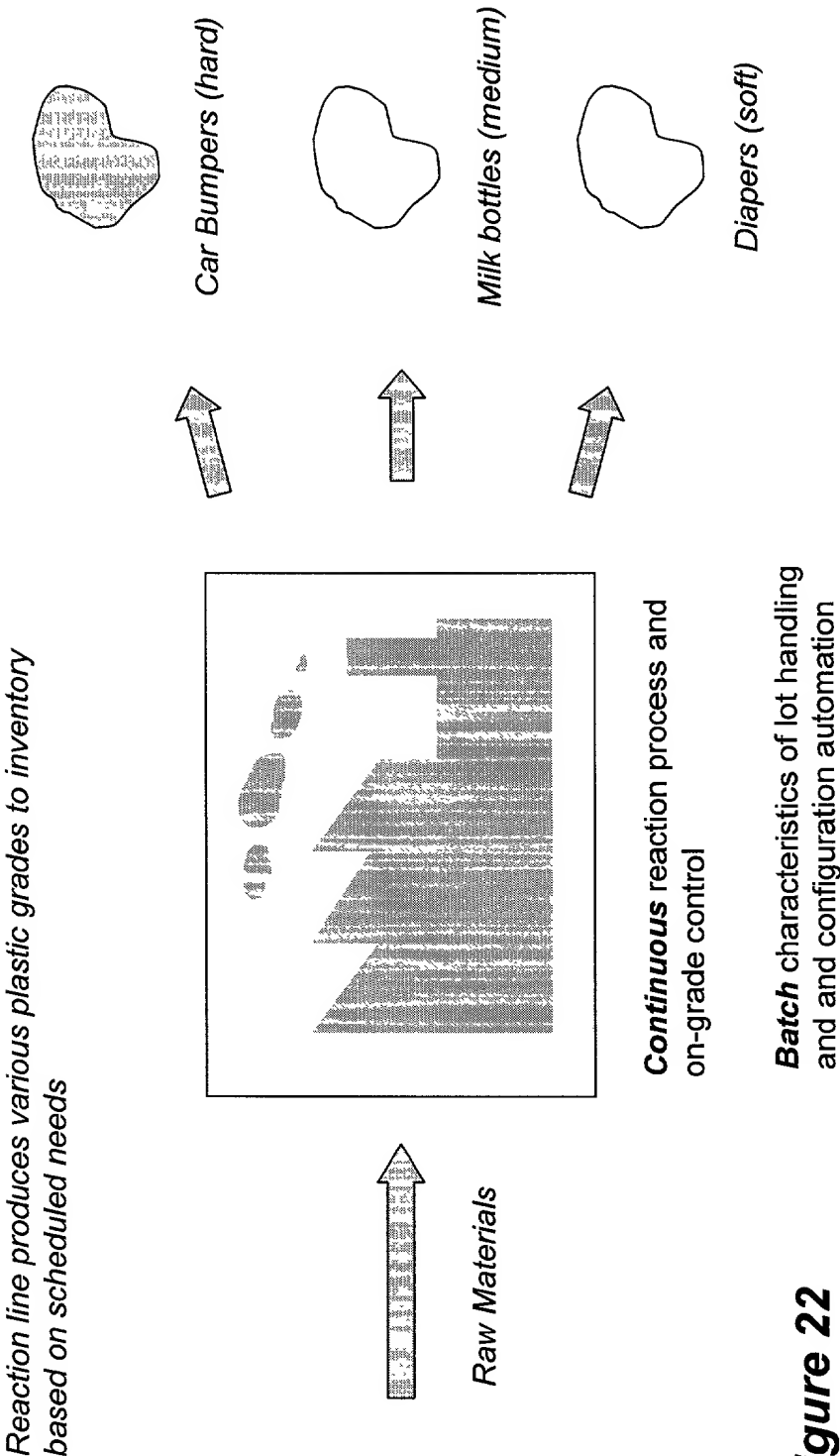
## Solutions Interact Within Framework

*"Integrated Decision-Optimization Network"*



**Figure 21**

Polymer Production Example



**Figure 22**

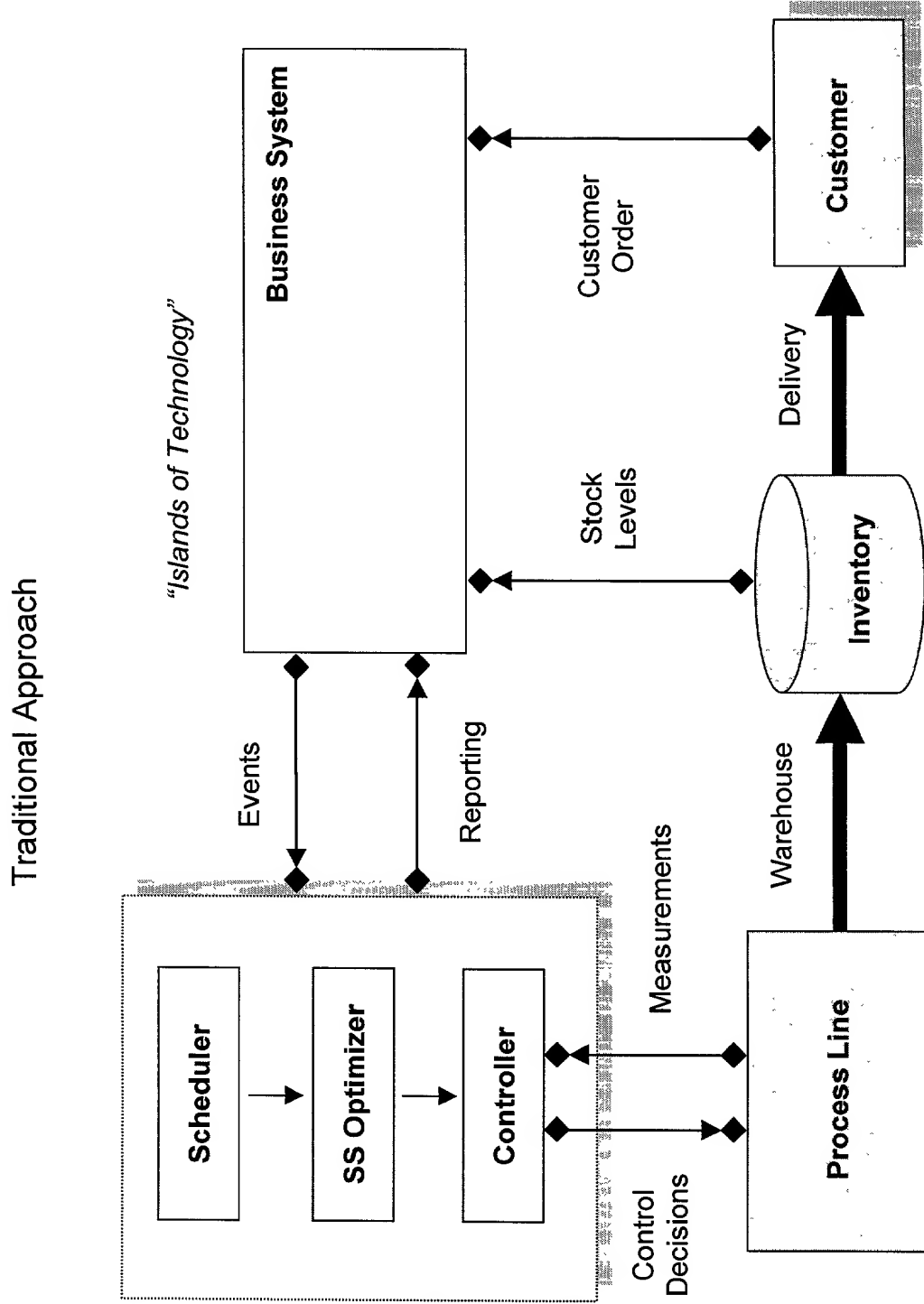
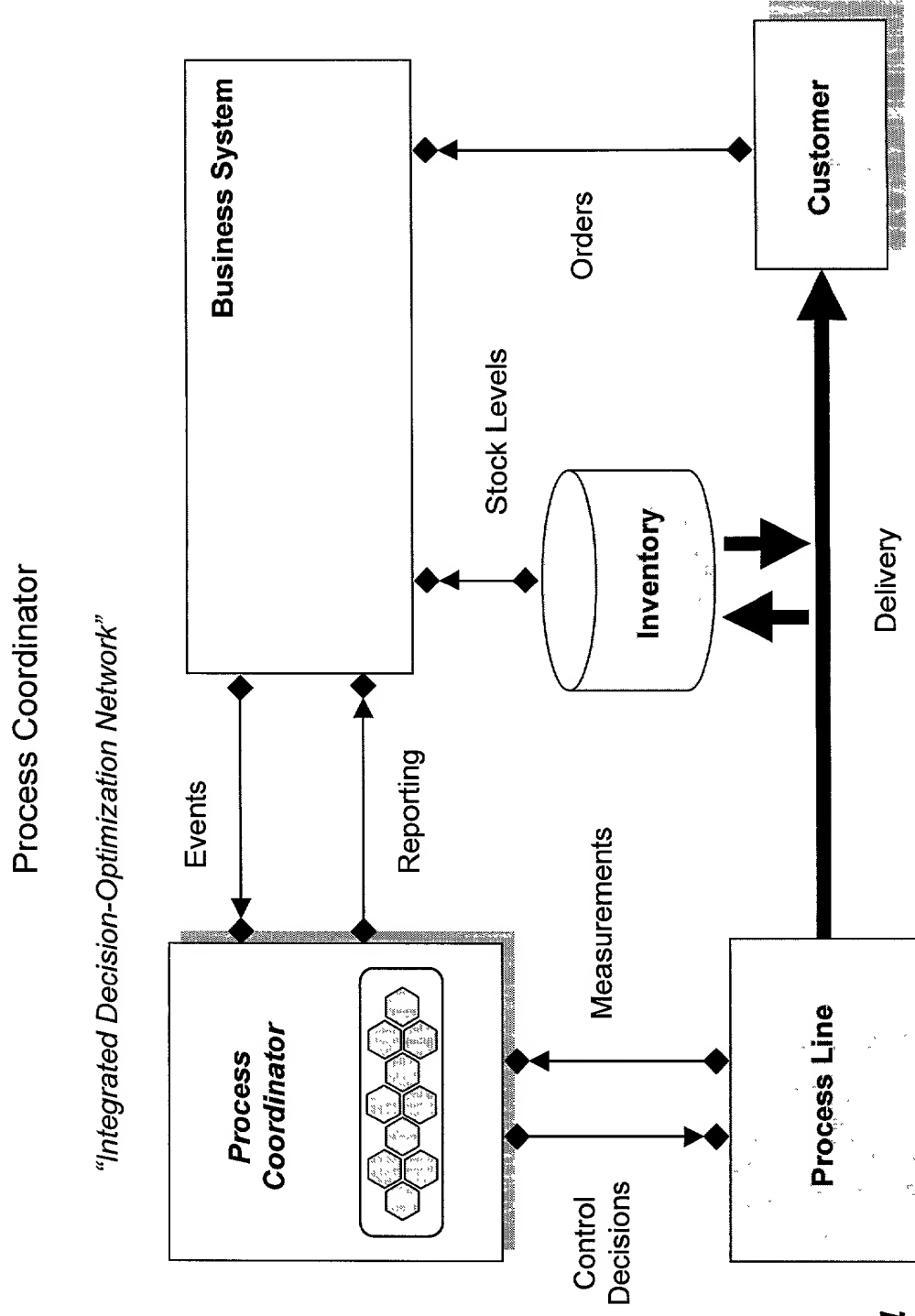


Figure 23



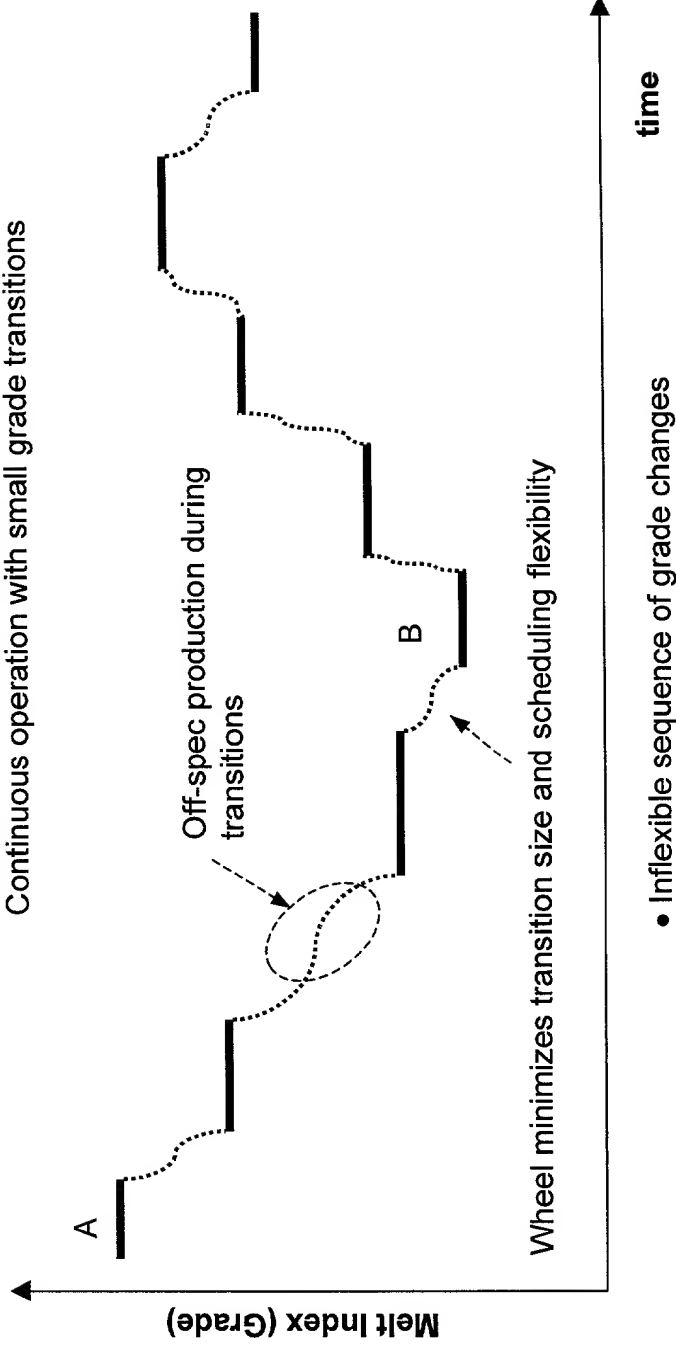
**Figure 24**



## Traditional Production Scheduling

### Production Wheel Strategy

Continuous operation with small grade transitions



**Figure 25**

## Flexible Grade Scheduling

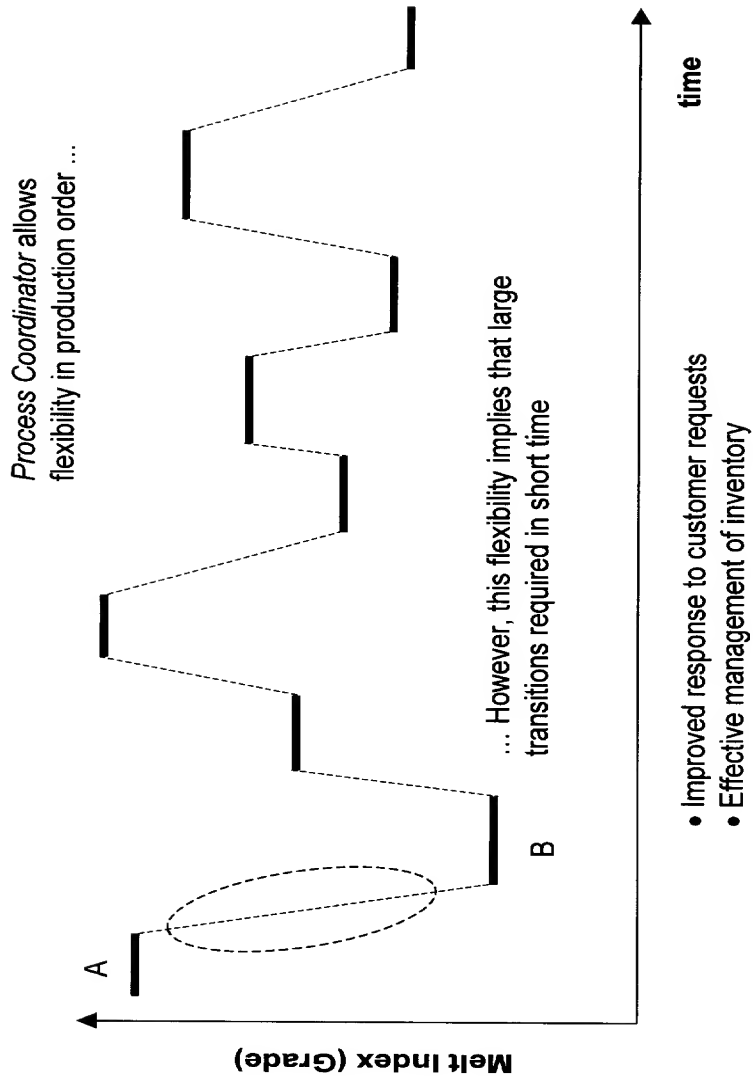
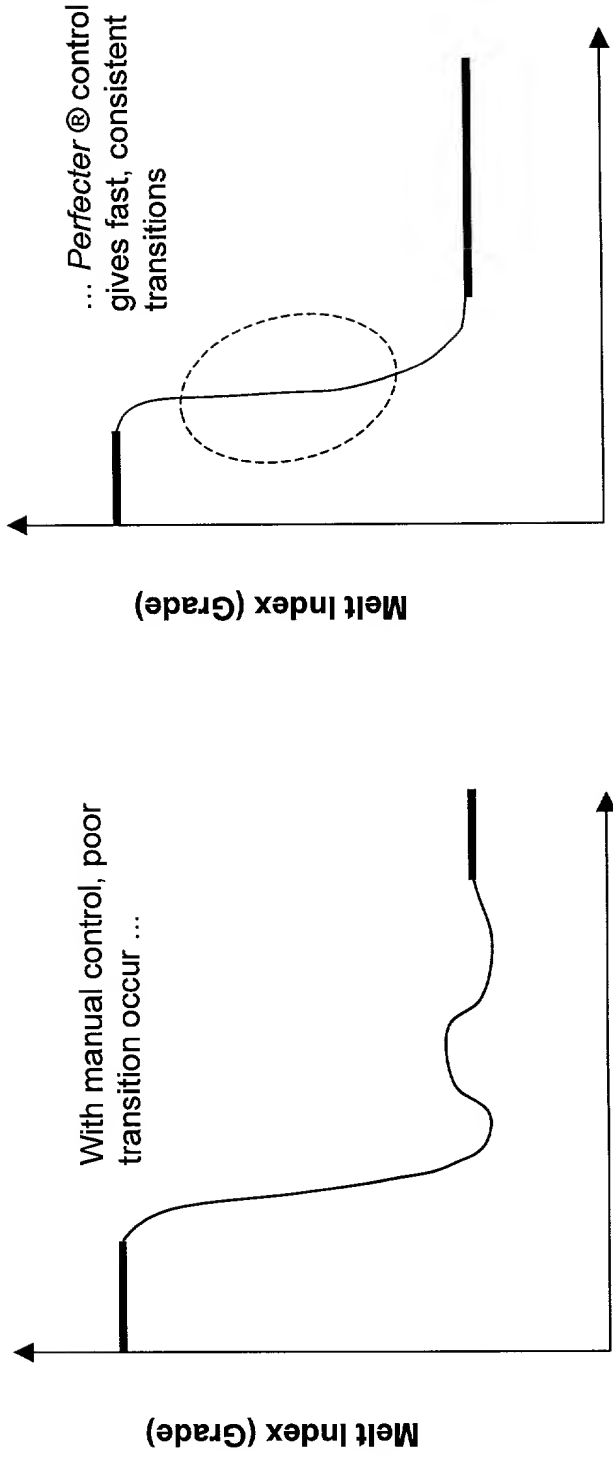


Figure 26

## Control Enables Flexible Transitions

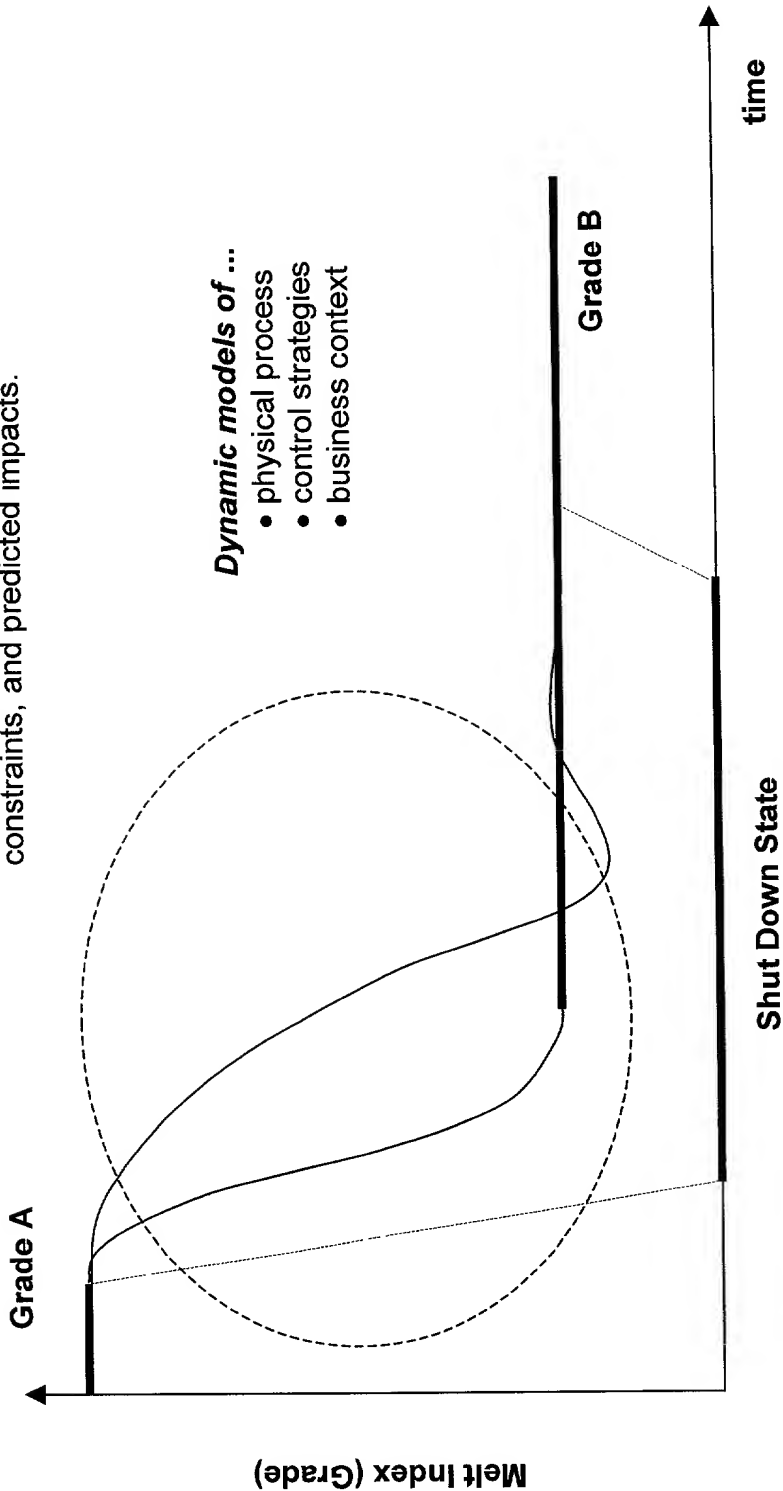


Process *Perfecter*® technology, which combines non-linear optimization and control, enables large, rapid, consistent transitions necessary for flexible scheduling.

**Figure 27**

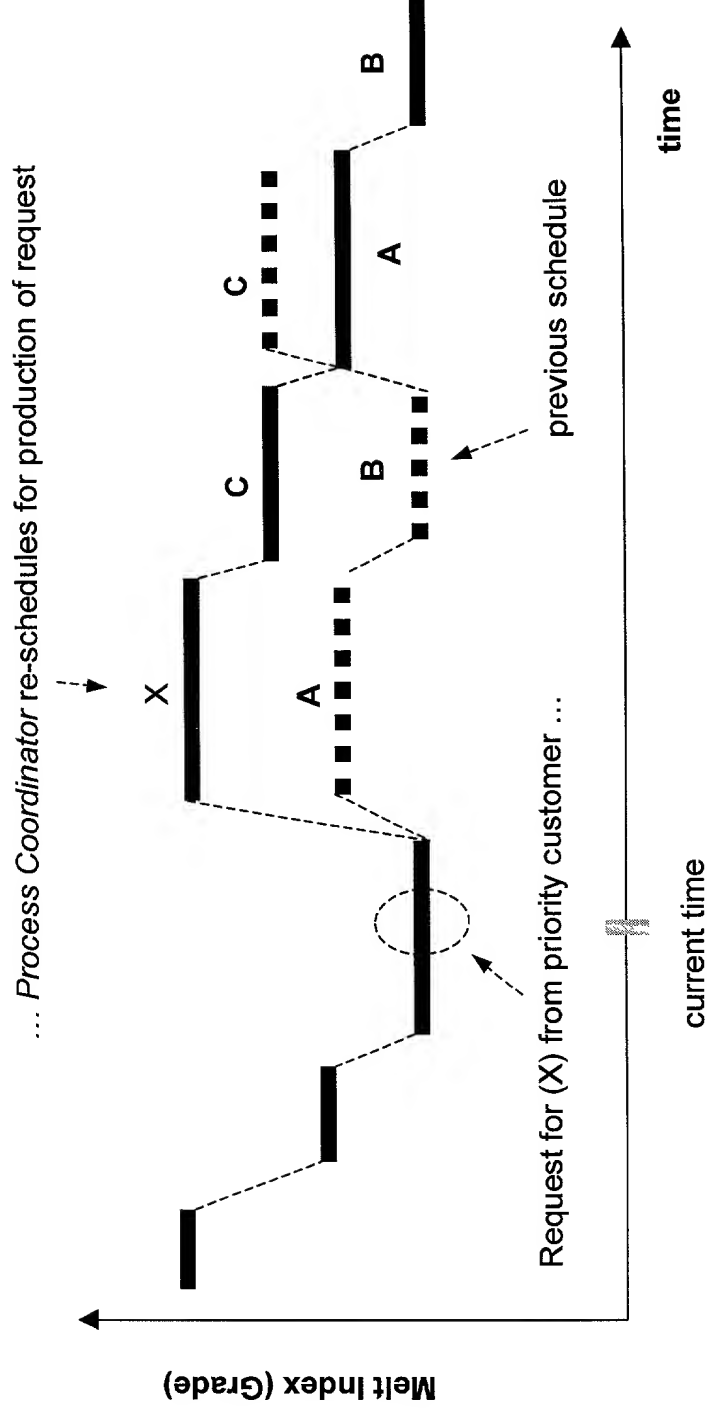
# Dynamic Models Provide Behavior

Unified dynamic models allow *Process Coordinator* to compute optimal decisions based on accurate costs, constraints, and predicted impacts.



**Figure 28**

## Event –Triggered Re-Scheduling



**Figure 29**

- Actual impact of request-fulfillment is known
- Down-stream scheduling re-optimized